Widespread Economic Impact Analysis for Montana Facilities: Vaughn

Draft

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1. Introduction

According to EPA's Interim Economic Guidance for Water Quality Standards (U.S. EPA, 1995), if financial tests demonstrate that pollution control expenditures would have substantial adverse economic impacts, the next step is to determine whether there would also be widespread economic impacts to the community or surrounding area. U.S. EPA (1995) does not provide specific standardized tests to determine whether impacts would be widespread; instead, it provides guidance on how to evaluate the magnitude of expected changes to indicators such as increased employment, losses to the local economy, changes in household income, decreases in tax revenues, indirect effects on other businesses, and increased sewer fees to remaining private entities. At a minimum, the analysis must define the affected community (the geographic area where project costs pass through to the local economy), consider the baseline economic health of the community, and evaluate how the proposed project will affect the socio-economic well-being of the community.

The Montana Department of Environmental Quality (Montana DEQ) has developed a set of descriptive and criteria questions designed to evaluate the potential for widespread impacts.[1] Appendix A provides the full list of questions as well as guidance provided by Montana DEQ in how to collect and interpret appropriate data.

In a previous analysis,[2] Abt Associates determined that the Vaughn Cascade County Sewer District (District) may experience substantial economic impacts as a result of meeting applicable numeric nutrient criteria. Based on Montana DEQ's widespread test, this document provides the results of a preliminary analysis to determine whether the impacts would be widespread. Each subsection corresponds to a question in Montana DEQ's test.

[1] PublicEntity_Worksheet_EPACostmodel_2016.
[2] Analysis dated June 30, 2016.

2. Descriptive Questions

2.1 Definition of Geographic Area

The Vaughn Wastewater Treatment Facility (WWTF), operated by the District, serves approximately 539 people in Cascade County (Montana DEQ, 2012). The community is within the metropolitan area of Great Falls, Montana.

For this analysis, EPA assumed that the affected community is service area of the District in the Vaughn Census-Designated Place (Vaughn CDP). Vaughn CDP has a population of approximately 804 residents (based on U.S. Census Bureau, 2014a). Since the WWTF likely does not serve any large industrial or commercial customers that provide employment, goods, or services to surrounding communities, we assume that the impacts of increased costs will not extend beyond the households served by the facility.[3]

The District's boundaries may not correspond exactly to the boundaries of the Vaughn CDP; it is possible that some households within the Vaughn CDP are not served by the District, and/or that there are some households served by the District that are not within the Vaughn CDP. Given that the population of the Vaughn CDP (804) is higher than the service population of the facility (539[4]), the Vaughn CDP is likely to encompass both the service population of the facility as well as some households that have septic systems or some other wastewater service provider. As such, the economic baseline for the Vaughn CDP as a whole may not be representative of the portion of the CDP that would be affected by the costs of the project. However, it is likely that the majority of the affected community is within the Vaughn CDP and as such, we assume that the economic baseline for the Vaughn CDP (as described in subsequent sections) represents the baseline for the affected community.

2.2 Description of General Economic Trends

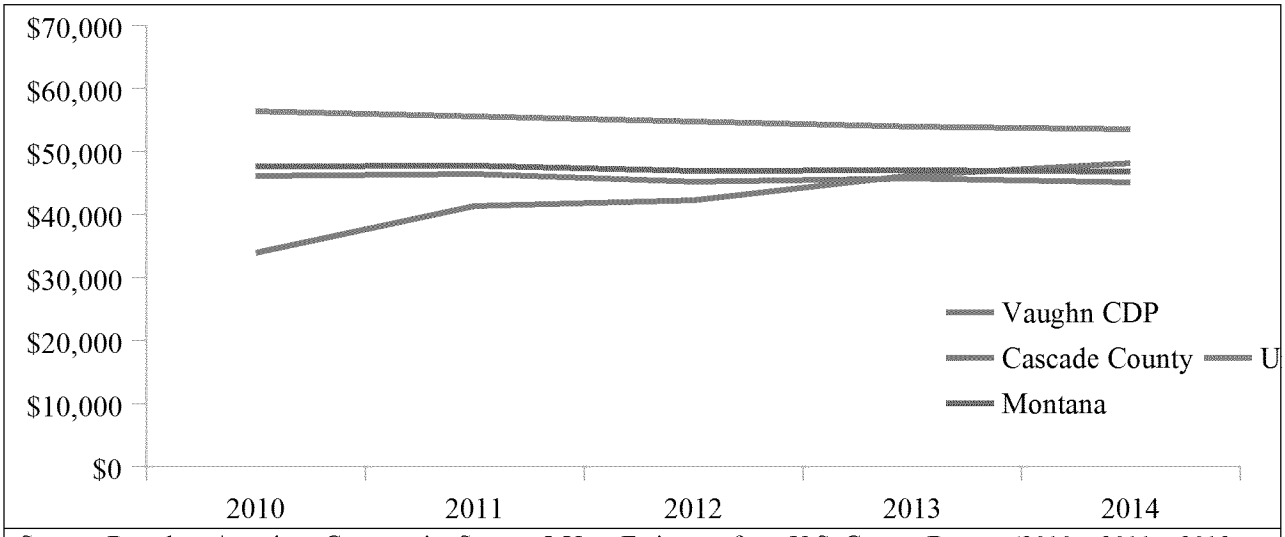
According to data from the U.S. Census Bureau's American Community Survey (ACS),[5] the Vaughn CDP has a higher MHI than the state, at $48,068 compared with $46,766 during the same time period (U.S. Census Bureau, 2014b). Exhibit 1 shows the MHI trends for the Vaughn CDP and the state compared with the United States between 2010 and 2014, with all dollar values adjusted to 2015$ using the Consumer Price Index (CPI; United States Bureau of Labor Statistics (U.S. BLS), 2016a). Over that time period, MHI in the Vaughn CDP increased by 42%, while the MHI in the state and nation declined (by 2% and 5%, respectively).

Exhibit 1. Median Household Income, 2010-2014

[3] There may be some businesses served by the District in addition to households. However, data from the Rural Community Assistance Corporation (2014), households bear 97% of costs, and as such we assume that households are the primary affected community.

[4] The statement of basis for the facility's NPDES permit (Montana DEQ, 2012) notes that the actual service population for the facility may be higher than the stated population of 539, since there are 249 hookups, which equates to 625 people served ("based on an engineering estimate of 2.5 people per household").

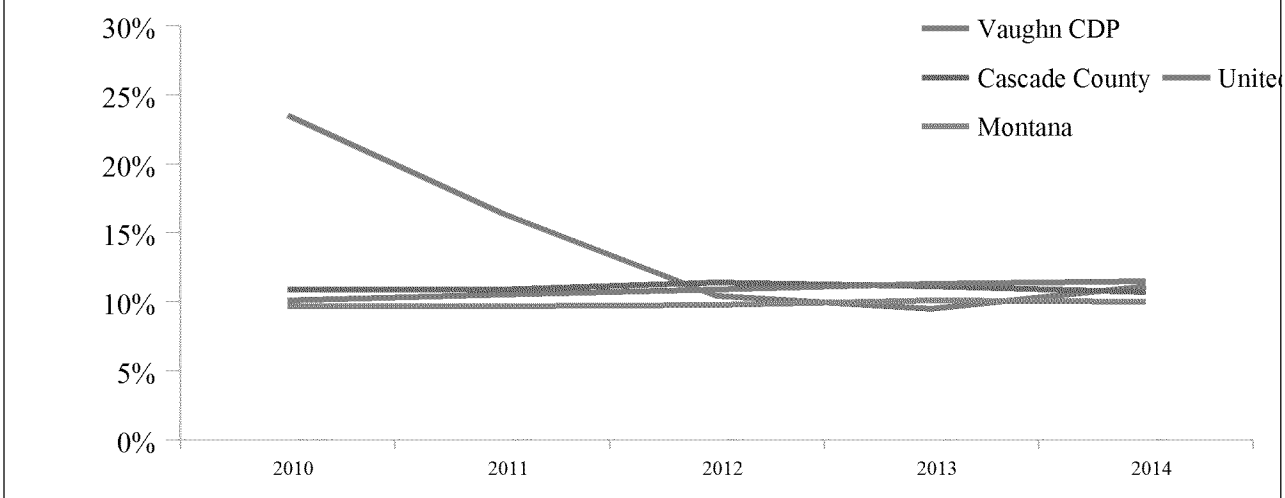
[5] For this analysis, all data from ACS represent 5-year estimates, which are available for all places and represent the most precise data available. These data are interpreted as being representative of 60 months of collected data; for example, 2014 data represents the data from January 1, 2010 and December 31, 2014. For more information, see U.S. Census Bureau (2016d).



Source: Based on American Community Survey 5-Year Estimates from U.S. Census Bureau (2010a; 2011a; 2012a; 2013a; 2014b); all values restated to 2015$ using the Consumer Price Index.

The poverty rate in Vaughn CDP (11.1%) is slightly lower than the United States (11.5%), and higher than Montana (10.0%), and Cascade County (10.7%). ACS data show that the local poverty rate sharply declined between 2010 and 2012, but then increased slightly in the 2014 data release. Exhibit 2 shows these trends.

Exhibit 2. Percent of All Families Under the Poverty Threshold, 2010-2014

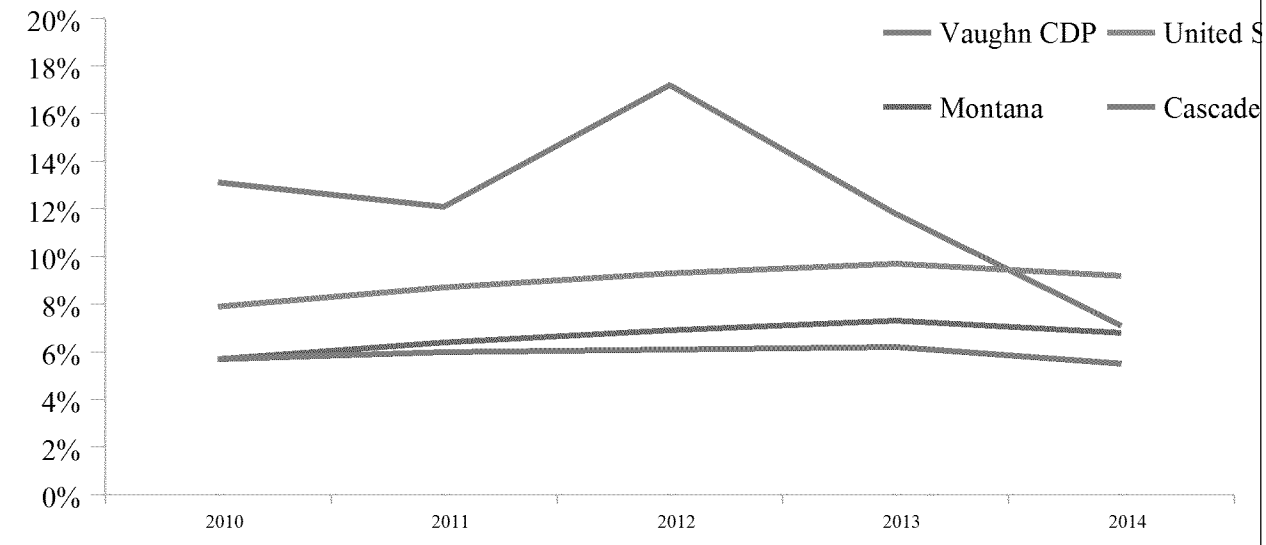


Source: Based on American Community Survey 5-Year Estimates from U.S. Census Bureau (2010a; 2011a; 2012a; 2013a; 2014b)

The unemployment rate in Cascade County was 4.1% in June 2016 (U.S. Bureau of Labor Statistics (BLS), 2016b), which is lower than the state rate of 4.2% (BLS, 2016c) and the national rate of 4.9% (BLS, 2016d). However, note that BLS data on unemployment is not available at the community level, but rather at the county level. The unemployment rate in Cascade County may not be representative of more local conditions in the Vaughn CDP. ACS data shows that the long-range trend is a higher

unemployment rate in Vaughn CDP compared with county, state, and national rates, but a sharp decrease in local unemployment since 2012. See Exhibit 3. The most recent ACS data indicates a Vaughn CDP unemployment rate of 7.1% compared with 5.5% in Cascade County (U.S. Census Bureau, 2014b).

Exhibit 3. Percent of Civilian Labor Unemployed, 2010-2014

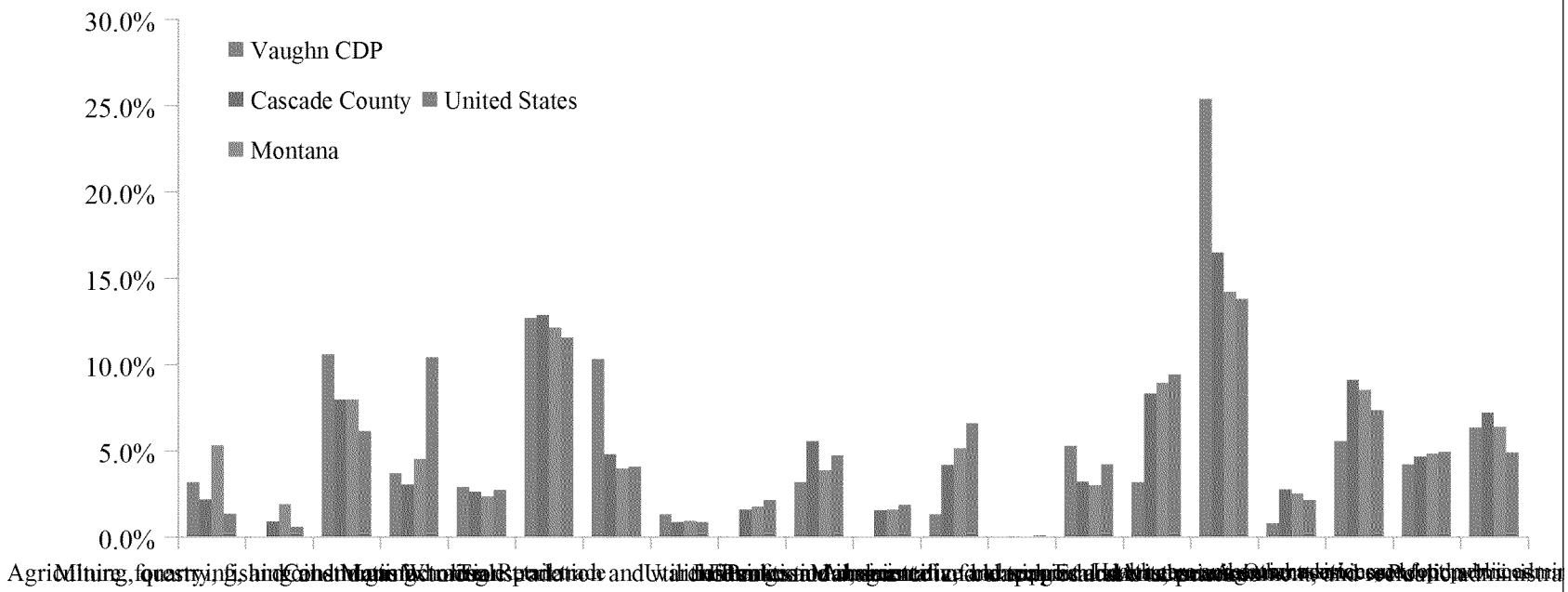


Source: Based on American Community Survey 5-Year Estimates from U.S. Census Bureau (2010a; 2011a; 2012a; 2013a; 2014b)

2.3 Description of Industry Status and Trends

The Census Bureau's ACS provides some information about the industries providing employment for the residents of Vaughn CDP, as well as at the county, state, and national levels, which is summarized in Exhibit 4. As shown in the exhibit, Vaughn CDP has a higher share of employment in the health care/social assistance (25.4%) and transportation/warehousing (10.3%) relative to the county, state, and national levels (which range from 13.8% to 16.5% for health care/social assistance and from 4.0% to 4.8% in the transportation/warehousing). Construction and retail trade also account for relatively large shares of employment in Vaughn CDP (10.6% and 12.7%, respectively).

Exhibit 4. Employment by Industry

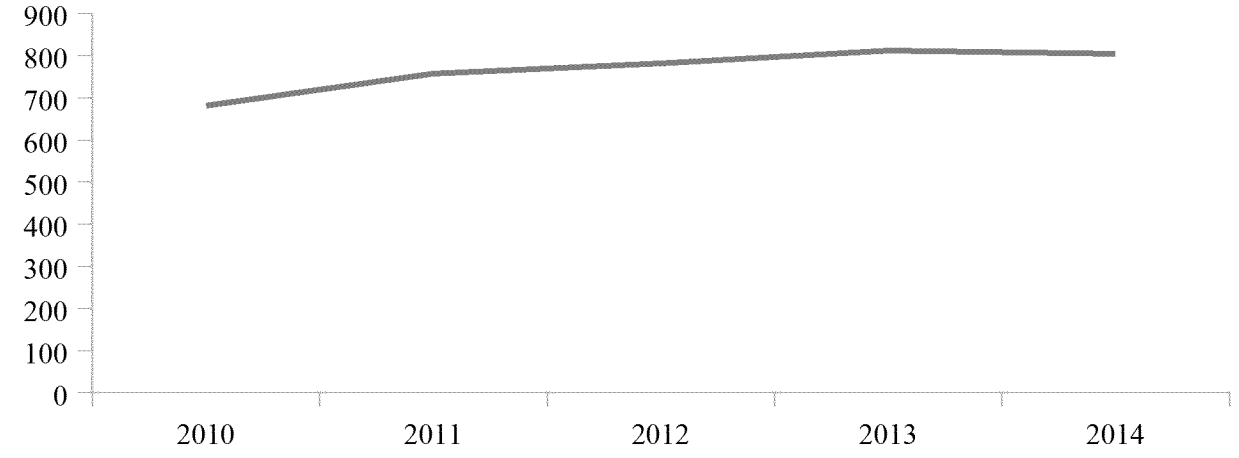


Source: Based on American Community Survey 5-Year Estimates from U.S. Census Bureau (2014c)

2.4 Description of Population Trend

According to 2014 ACS data (U.S. Census Bureau, 2014a), Vaughn CDP has a population of 804, which reflects an increase over the prior 5 years. Exhibit 5 shows the ACS population trend between the 2010 and 2014 data releases.

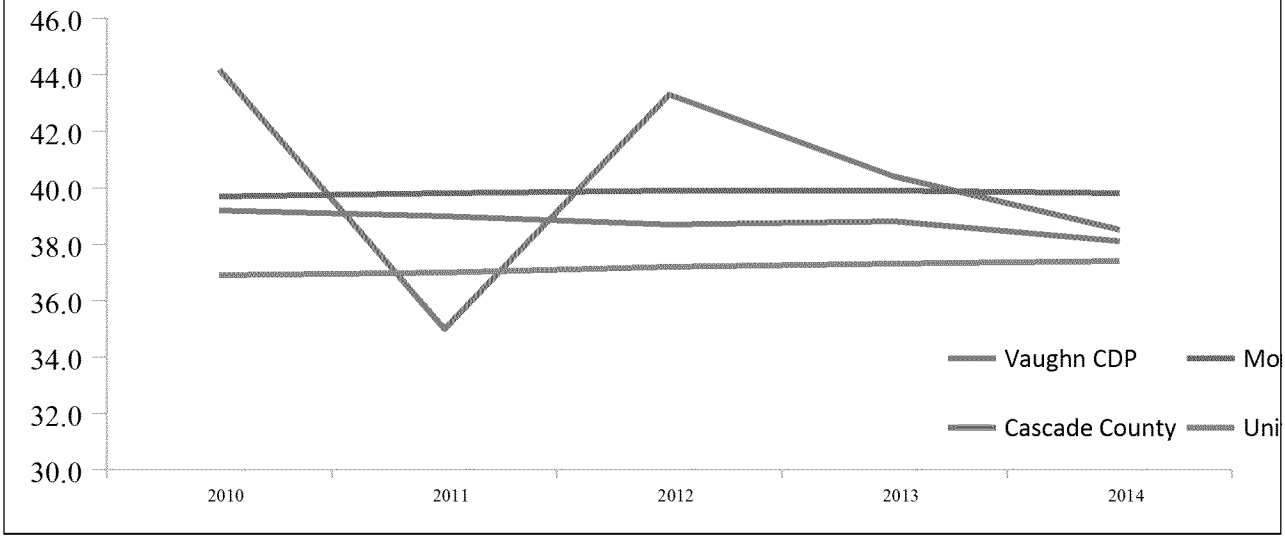
Exhibit 5: Population of Vaughn CDP, 2010-2014



Source: Based on American Community Survey 5-Year Estimates from U.S. Census Bureau (2010b; 2011b; 2012b; 2013b; 2014a)

The median age in the Vaughn CDP has been highly variable over the same period. Exhibit 6 shows the median age in the CDP, county, state, and nation over the 2010 through 2014 ACS data releases. In the 2014 data release, the median age in the Vaughn CDP was 38.5 compared with 38.1 in Cascade County, 39.8 in Montana, and 37.4 in the United States. According to ACS, 26.6% of households in Vaughn CDP have retirement income, compared with 17.9% at the state level and 17.8% nationally.

Exhibit 6. Median Age of Population, 2010-2014



Source: Based on American Community Survey 5-Year Estimates from U.S. Census Bureau (2010b; 2011b; 2012b; 2013b; 2014a)

The 2014 ACS reports that approximately 13% of adult Vaughn CDP residents have attained Bachelor's degrees or higher, compared with 29 % at the state and national levels (see Exhibit 7). About 87% of Vaughn CDP residents (25 years and over) have attained a high school diploma or higher, compared with 92% at the state level and 86% at the national level (U.S. Census Bureau, 2014d).

Exhibit 7: Educational Attainment

Education Level (population 25 years and over)	Vaughn CDP	Montana	United States
Less than 9th grade	2.4%	2.2%	5.8%
9th to 12th grade, no diploma	11.1%	5.3%	7.8%
High school graduate (includes equivalency)	40.8%	29.8%	28.0%
Some college, no degree	25%	25.3%	21.2%
Associate's degree	7.5%	8.3%	7.9%
Bachelor's degree	10.2%	19.8%	18.3%
Graduate or professional degree	3.0%	9.2%	11.0%

Source: Based on American Community Survey 5-Year Estimates from United States Census Bureau (2014d)

3. Criteria Questions

3.1 General Economic Impacts

According to the Rural Community Assistance Corporation (2014), the existing annual household costs are $384, and we previously estimated that the pollution control project would increase the costs by $308, for a total annual cost per-household of $692. This represents a monthly increase of approximately $26 per household. Total wastewater costs per household would represent 1.5% of MHI (see the substantial impacts analysis).

In the evaluation of substantial impacts, we estimated that households bear 97% of baseline costs and would bear the same portion of project costs, or $88,271 out of a total project cost of $91,001. Non-household customers of the wastewater system would bear the remaining project costs of $2,730 in addition to existing costs of $3,436 (for a total of $6,166).

The potential for the pollution control costs to impact development potential is described further under Section 3.3.

3.2 Employment Impacts

The District WWTF primarily serves residential customers, with a very small share of revenues from non-residential customers. These non-residential customers may be businesses that will incur some cost increases as a result of the pollution control project, but are not likely to represent a large share of employment of Vaughn residents. For the purpose of this analysis, we assume that the majority of Vaughn residents are employed outside the sewer district, and that employment will not be meaningfully impacted by the pollution control expenditures.

3.3 Development Impacts

According to a 2014 Montana Rate Study (Rural Community Assistance Corporation, 2014), baseline average household wastewater rates in the District are $32 per month, while the average monthly wastewater rate for communities with a population between 500 and 7,500 is $36.27. As such, the District's existing wastewater rate is comparable to others within the state. Monthly rates in other communities within the Great Falls metropolitan area are higher than or comparable to Vaughn's [including Cascade ($47), Black Eagle ($26) (Montana Rural Assistance Corporation, 2014), and Sun Prairie ($27) (Decker, 2015)].

In the substantial impact analysis, we estimated that the monthly household cost would increase by about $26, which almost double the existing rate. As such, it is possible that the increased wastewater treatment costs may cause some decline in local residential development relative to the baseline scenario (i.e., without the additional costs). Increased wastewater rates could also reduce the community's ability to attract new investments. This impact is more likely if the community's wastewater rates become significantly higher than those in surrounding areas.

However, existing rates in surrounding communities may not be the appropriate basis for comparison to the District's projected wastewater fees (including the pollution control project). Municipalities statewide and nationwide increasingly have to address nutrient impairments through improvements in treatment controls. Such improvements are expected to continue throughout Montana, increasing wastewater rates

for many communities (see Fraser, 2016). For example, the Montana communities of Great Falls, Butte, Stevensville, Livingston, and Whitefish have all made recent upgrades to (or plan to upgrade) their wastewater collection and treatment systems, funded through increased fees (Rowell, 2016; Smith, 2016; Backus, 2016; City of Livingston, 2016; Flathead Beacon, 2016).

If surrounding communities' rates increase in a similar magnitude to those of the District, the potential for adverse development impacts will be mitigated.

3.4 Disposable Income Impacts

With the pollution control project, annual household wastewater expenses in the District would increase from $384 to $692 (an increase of 80%). As noted above under Section 3.1, this represents an increase of approximately $26 per month. This increase may depress local economic activity due to reduced purchasing power by affected residents. The magnitude of these impacts depends on the extent to which higher sewer bills reduce household expenditures on other locally produced goods and services.

The adverse impact to disposable income in the affected community will be exacerbated if outside contractors are used in the design and construction of the needed upgrades, since the additional wastewater revenues collected will be spent outside the community. On the other hand, if the expenditures stay in the community, adverse disposable income impacts could be offset by increased income for local workers and businesses benefitting from construction of new wastewater infrastructure.

3.5 Poverty Level Impacts

According to data from U.S. Census Bureau (2014b), 11.1% of families in Vaughn CDP had an income below the poverty level. This represents an increase from 9.5% since the 2013 data release and a slightly higher rate than the county and state for the same period (10.7% and 10.0%, respectively). If increased wastewater fees were to result in some local loss of income, this may cause the poverty rate to increase in the community.

3.6 Multiplier Effects

To the extent that the capital investment and continuing operating and maintenance (O&M) expenditures become revenues to local businesses and employees, there is potential that the increase in user fees will actually result in a net economic benefit through a multiplier effect. Economic multipliers measure the overall effect on direct, indirect, and induced demand caused by a $1 increase in output for a particular industrial sector. The additional utility costs to install and operate new treatment systems that are spent in the local economy directly increase demand for local goods and services. To meet the increased demand, providers of those goods and services must also increase demand for their inputs, which is an indirect demand impact if they also purchase local inputs. In addition, the revenues and incomes received by local businesses and workers can increase the demand for other local goods and services, which is induced demand because of higher business profits or worker income. The multiplier effect occurs when these direct, indirect, and induced expenditures remain in the local economy, and will be higher in the short-term during the construction phase.[6] On the other hand, if goods and services are purchased from outside the local economy, the money 'leaks' out and the multiplier effect diminishes.

[6] The multiplier effects will continue in the longer term at a decreased impact (compared with during construction), as the expenditures associated with operations and maintenance of the new treatment systems continue.

Balanced against the beneficial multiplier benefit of the expenditures on treatment are the corresponding reductions in consumer spending caused by increased sewer fees. That is, the expectation is that an additional household consumer spending requirement for wastewater means reduced spending on everything else, assuming household income does not change. The portion of Vaughn households' spending that occurs locally is a key driver of the magnitude of this effect in Vaughn itself. Generally speaking, consumer expenditures can have very high leakage rates because expenditures on consumer goods (e.g., groceries or hardware) and services (e.g., financial services) that are not locally produced tend to leave the local economy. If the leakage from the utility expenditures is less than the leakage from consumer expenditures, then theoretically there is a likely net economic benefit, depending on the exact leakage rates and multiplier values for each economic sector. Whether this is the case is unknown, however, because we do not have industrial multipliers specific to Vaughn CDP. Net benefits measured for larger regions (e.g., at the state level) tend to show a net economic benefit. Krop et al. (2008) report the multiplier for the water and sewer industry was 1.799 (i.e., an extra $1 in water and sewer industry output results in a $1.79 increase in Montana-wide output), which may be higher than the multiplier on state-wide consumer expenditures. That value was based on 1997 industrial input-output relationships; current relationships likely differ, so the multiplier today will also differ. It is unlikely that Vaughn has a multiplier this high, especially if the capital goods and specialty services (e.g., engineering) come from outside the community. In fact, if a large proportion of capital or O&M expenditures leak from the local economy, the multiplier could be less than 1.0.

3.7 Net Debt Impacts

Additional pollution controls would increase the District's annual wastewater treatment costs, from $113,644 currently to $204,645 (including annualized capital and recurring O&M costs).

As noted in the substantial impact analysis, the District currently has 24,360 in overlapping debt for Cascade County. If the District is unable to finance the additional controls via grants, it would need to take on additional debt. As described in the substantial impact analysis, we estimated that the capital costs (including land) of the project would be in the range of $1.23 million.

3.8 Water Quality Impacts

The WWTF discharges to the Sun River, which is classified for drinking, culinary, and food processing purposes (after conventional treatment); bathing, swimming, and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply. The Sun River is used extensively for irrigation purposes, and is also a popular site for recreational fishing.

Based on Montana's 2012 list of impaired waters, the river is not supporting the aquatic life use and only partially supporting the agricultural and recreational uses. Nitrogen, phosphorus, and suspended solids are probable causes of impairments, and Sun Prairie and Vaughn WWTFs have waste load allocations for nitrogen and phosphorus from a 2005 TMDL.

3.9 Additional Impacts

None applicable.

4. Summary and Conclusions

The Vaughn Cascade County Sewer District (District) wastewater treatment facility serves approximately 539 people in the Vaughn CDP. The population that would be affected by an increase in wastewater fees to fund pollution control projects constitutes the entire service population of the District. As shown in a prior analysis, the costs associated with meeting the applicable numeric nutrient criteria could result in substantial adverse impacts to the community, due to the costs and baseline economic situation in the community.

The baseline economic status of the Vaughn CDP also provides some insight into whether the impacts of pollution control expenditures would be widespread in addition to being substantial. Based on several economic indicators, the community does not appear to be disadvantaged in the baseline. MHI is high relative to the state, and unemployment and poverty rates are generally comparable to or more favorable than county and state rates. Additionally, the population of the community has increased since 2010.

Expenditures on pollution control projects will yield local benefits. For example, municipal investments in infrastructure can lead to increased economic activity. The costs associated with installing and operating new treatment systems increase demand for goods and services, which in turn increases the demand for inputs. In addition, the revenues and incomes received by local businesses and workers can increase the demand for other local goods and services, further increasing economic activities. On the other hand, increased household expenditures on wastewater fees reduce households' disposable income. The net economic effect is uncertain.

As determined in the substantial impact analysis, additional pollution controls would increase the District's annual wastewater treatment costs, from $113,644 currently to $204,645 (including annualized capital and recurring operations and maintenance costs). Household wastewater costs would increase from $384 to $692, an increase of approximately $26 per month.

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United States Census Bureau. 2013b. American Community Survey (ACS) Table DP05: Demographic and Housing Estimates. 2009-2013 5-Year Estimates.

United States Census Bureau. 2012a. American Community Survey (ACS) Table DP03: Selected Economic Characteristics. 2008-2012 5-Year Estimates.

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United States Census Bureau. 2011a. American Community Survey (ACS) Table DP03: Selected Economic Characteristics. 2007-2011 5-Year Estimates.

United States Census Bureau. 2011b. American Community Survey (ACS) Table DP05: Demographic and Housing Estimates. 2007-2011 5-Year Estimates.

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6. Appendix A: Montana Widespread Impact Test

6.1 Descriptive Questions[7]

1. Geographic Area: Define the affected study area or community. This is the geographic area where direct project costs pass through to the local economy. In the case of municipal pollution control projects, the affected community is usually the immediate municipality. There are, however, exceptions where the affected community includes individuals and areas outside the immediate community. For example, if business activity of the region is concentrated in the immediate community, then outlying communities dependent upon the immediate municipality for employment, goods, and services should also be included in the Widespread analysis. Thus, the Widespread geographical area can encompass a greater area than the immediate town and/or those served by the wastewater system. It can encompass a greater area than defined in Substantial impacts.[8]

2. General Economic Trend: Describe the current general economic trend in the study area or community--qualitatively or quantitatively.

3. Industry Status and Trends: Name the main industry(s) in the study area and indicate if any major industries are intending to enter the area or leave the area. What is the current health of the main industry or of each significant industry if there is more than one? Is the boom and bust potential for the study area great?

4. Population Trend: Indicate the general population trend in the area. Is the community growing or shrinking? If the information is available, you may consider additional population trends such as whether young people are staying in the area or leaving after they graduate school.

6.2 Criteria Questions

5. General Economic Impacts: Describe how the economy in general would be affected, if at all, by having to meet the new water quality standard. Items of discussion could include any loss in population, changes in median income, the closing (or moving to another area) of one or more businesses and industries, or the impact on community and/or commercial development potential in the study area. One can use the baseline data from the Substantial tests to support this answer as well as the answers to the Descriptive questions above.

[7] Helpful resources:

- Local chamber of commerce.
- Montana Dept of Commerce's Certified Regional Development Corporations (CRDC) program. All the counties except Flathead and Richland participate in the program. For information. go to http://businessresources.mt.gov/CRDC.
- The Small Business Development Center (SBDC) can be found at http://sbdc.mt.gov/.
- The American Community Survey is conducted annually and provides long form data on an annual basis for states, counties, incorporated cities and towns, census designated places (CDPs), census tracts and block groups. For more information about the ACS, go to https://www.census.gov/programs-surveys/acs/.
- The number of businesses by industry, the number of employees and an estimated payroll is available through the County Business Patterns of the US Census Bureau available at http://www.census.gov/programs-surveys/cbp.html.
- The Montana Dept of Commerce/Census and Economic Information Center, (406) 841-2740.
- Employment by sector data is available at the state and county level, not for communities. The Montana Department of Labor and Industry publishes this data.

[8] Here are some examples. If business activity in the region is concentrated in a nearby community and not in the immediate community, then the nearby community may also be affected by loss of income in the immediate community and should be included in the analysis. Similarly, if a large number of workers commute to an industrial facility that is significantly affected by the costs, then the affected community should include the home communities of commuters as well as the immediate community.

6. Employment Impacts: Will meeting the nutrient standards lead to a loss of employment due to a reduction in business activity or closure? Please give specific examples of what might happen?

7. Development Impacts: Will meeting new water quality standards have a substantial effect on residential and commercial development patterns? For example, would homes and businesses choose to locate in different areas or outside of town as a result of higher wastewater fees? In this answer, one may explore historical development patterns, financial and/or tax revenue impacts, population growth impacts, unintended impacts on water quality and any other potential consequences (good or bad).

8. Disposable Income Impacts: What would be the estimated impact, if any, on disposable income of having to meet standards? If the information is available, the applicant may describe how this change in disposable income would affect the overall economy in the area under consideration.

9. Poverty Level Impacts: What is the current poverty level in the affected area and what challenges to this value will occur as a result of the cost of compliance with water quality standards?

10. Multiplier Effects: Are there any multiplier effects from cost or benefits as a result of having to meet the new water quality standard? In other words will a dollar lost or gained as a result of the criteria result in the loss or gain of more than one dollar in the study area (e.g. direct and indirect spending)?

11. Net Debt Impacts: What would be the estimated change in overall net debt of the municipality as a result of having to meet numeric nutrient standards? Would towns closely approach or exceed their debt limits as a result of meeting water quality standards?

12. Water Quality Impacts: Would improved water quality as a result of meeting water quality standards have any widespread positive economic and/or ecological effects on the community? Would expenditures on pollution controls to reach attainment have any positive effects on the community? See the 'Benefits of Water Quality' tab for more details.

13. Additional Impacts: Is there any additional information that suggests that there are unique conditions in the affected community that should also be considered?

6.3 Summary and Conclusions

Please summarize why you believe that the costs of compliance with water quality standards creates a widespread and adverse economic impact in your community that would override the need for increased pollution control.

The main question to ask is whether widespread economic impacts are likely to occur in the study area as a result of attempting to comply with new water quality standards. The key aspect of a "widespread determination" is that it evaluates change in any socioeconomic conditions that would occur as a result of compliance (EPA 1995).

The analyst should take into account as many of the factors listed above as possible when making a decision on whether impacts are widespread. The decision should be made based on all appropriate factors in an objective manner (rather than as a checklist). The analyst will use his or her judgement on whether all the factors taken together (including some that may not be on this list) constitute widespread impact. Likewise, applicants should not view this guidance as a check list. In all cases, socioeconomic impacts should not be evaluated incrementally; rather, their cumulative effect on the community should

be assessed as a whole. Applicants should feel free to use anecdotal information to describe any current community characteristics or anticipated impacts that are not listed in the worksheet.